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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/596,480

02/27/2007

Jorg Beilharz

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BAKER BOTTS L.L.P.

PATENT DEPARTMENT

98 SAN JACINTO BLVD., SUITE 1500

AUSTIN, TX 78701-4039

EXAMINER

COLEMAN, KEITH A

ART UNIT

PAPER NUMBER

3747

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/596,480	<b>Applicant(s)</b> BEILHARZ ET AL.	
	<b>Examiner</b> KEITH COLEMAN	<b>Art Unit</b> 3747	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/7/2006</u> .  | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6 and 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsuzuki et al. (US Patent No. 5,057,734)

With regards to claims 1, 2, and 14 , the patent to Tsuzuki et al. discloses a method for controlling a valve (7, See Figure 3) with a valve actuating device (piezoelectric mechanism 77), which is provided in the form of a piezo actuator (i.e. piezoelectric element 77), with a valve element (i.e. valve 7), a valve body (1) and a valve seat (i.e. the interior of cavity 1 and orifices 3, See Figure 3), in which the method comprising the steps of: moving at a predeterminable point in time (i.e. in increments of 200 microseconds, See Figure 12) the valve element (7) is moved at a predeterminable point in time from a position in contact with the valve seat (See Figure 12) into a predetermined position away from the valve seat by a discharging process of the piezo actuator (77), dividing the discharging process is divided into a first discharging duration (i.e. cycles through in microseconds, Col. 12, Lines 65-68 through Col. 13, Lines 1-10), during which a predetermined first amount of electrical energy (i.e. 1000 volts to 0 volts,

See Figure 12) is discharged from the piezo actuator (77), a subsequent holding time duration, during which the piezo actuator is not controlled (See Figure 12), and a subsequent second discharging duration, during which a predetermined second amount of electrical energy is discharged from the piezo actuator (77), and dependent on the waveform of a voltage at the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator adapting, during the holding time duration, the holding time duration and/or the first discharging duration is adapted in order to ensure precise control of the valve (i.e. dependent on the LC oscillation circuits, Col. 13, Lines 1-30).

With regards to claims 3 and 15, the patent to Tsuzuki et al. discloses wherein the holding time duration and/or the first discharging duration or the first charging duration is/are adapted dependent on the amplitude and/or the period of the waveform of the variable (i.e. dependent on the piezoelectric actuator and cycles in microseconds and the LC oscillation circuit, See Col. 13, Lines 1-30) which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (inherent in a LC oscillation circuit).

With regards to claims 4 and 16, the patent to Tsuzuki et al. discloses the holding time duration is adapted dependent on the period of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (See Col. 14, Lines 40-55, and See Figure 12).

With regards to claims 5 and 17, the patent to Tsuzuki et al. discloses wherein the first discharging duration or the first charging duration is adapted dependent on the amplitude of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (i.e. dependent on equations shown on Col. 12, Lines 30-36).

With regards to claims 6 and 18, the patent to Tsuzuki et al. discloses wherein the sum of the first charging duration and the holding time duration is limited to a maximum value (i.e. modulated in microseconds, Col. 9, Lines 6-15), which ensures that the valve element (20) is still in contact with the valve seat.

Claims 7-13, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuzuki et al. (US Patent No. 5,057,734) in view of Rodriguez-Amaya (US Patent Publication 2002/0113139)

With regards to claims 7, 12, and 19, the patent to Tsuzuki et al. discloses a control unit (See Figure 8), which comprises an outlet duct that is connected hydraulically to the working space (78), the piezo actuator (77) that forms a valve actuating device (See Figures 1 and 8), and the valve (7), whereby the valve comprises a valve element (7), a valve body (i.e. nozzle), a valve seat (i.e. interior of the nozzle shown in Figure 1), wherein the valve is part of a pump/nozzle device with a pump (i.e. plunger 12 in hole 1), which has a piston (12) and a working space (11), except

positively disclosing an auxiliary control chamber which is disconnected hydraulically from the outlet duct when the valve element is in contact with the valve seat and which otherwise is connected hydraulically to the outlet duct.

The patent to Rodriguez-Amaya discloses wherein a valve (5) is part of a pump/nozzle device with a pump (2, See Figure 6), which has a piston (2) and a working space (1), an auxiliary control chamber (11 and 12) which is disconnected hydraulically from the outlet duct (3) when the valve element (5) is in contact with the valve seat and which otherwise is connected hydraulically to the outlet duct.

Since both references are concerned with injection phases (See Paragraph 20 from Rodriguez-Amaya et al. and Col. 3, Lines 1-20 from Tsuzuki et al.), it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the fuel injector of Tsuzuki et al. with wherein the valve is part of a pump/nozzle device with a pump , which has a piston and a working space, an auxiliary control chamber which is disconnected hydraulically from the outlet duct when the valve element is in contact with the valve seat and which otherwise is connected hydraulically to the outlet duct in view of the teaching to Rodriguez-Amaya, in order to compensate for pressure variations (See Paragraph 2 from Rodriguez-Amaya et al.)

With regards to claims 8, 13, and 20, the combination of Tsuzuki et al. and Rodriguez-Amaya discloses all the limitations of the claimed subject matter including Tsuzuki et al. disclosure of wherein the first discharging duration is limited to a minimum

value (i.e. the controller cycles through in microseconds, See Figure 12), which ensures that the nozzle needle closes the nozzle (See Figure 12).

With regards to claim 9, the combination of Tsuzuki et al. and Rodriguez-Amaya discloses all the limitations of the claimed subject matter including Tsuzuki et al. disclosure of wherein the holding time duration and/or the first discharging duration or the first charging duration is/are adapted dependent on the amplitude and/or the period of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (i.e. inherent in a LC oscillation circuit and See Col. 12, Lines 30-40 and Figure 12).

With regards to claim 10, the combination of Tsuzuki et al. and Rodriguez-Amaya discloses all the limitations of the claimed subject matter including Tsuzuki et al. disclosure of wherein the holding time duration is adapted dependent on the period of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (i.e. inherent in a LC oscillation circuit and See Col. 12, Lines 30-40 and Figure 12).

With regards to claim 11, the combination of Tsuzuki et al. and Rodriguez-Amaya discloses all the limitations of the claimed subject matter including Tsuzuki et al. disclosure of wherein the first discharging duration or the first charging duration is adapted dependent on the amplitude of the waveform of the variable which is

characteristic of the oscillation behavior of the piezo actuator during the holding time duration (i.e. inherent in a LC oscillation circuit and See Col. 12, Lines 30-40 and Figure 12).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bock et al. (US Patent No. 6,766,791) shows the current state of the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH COLEMAN whose telephone number is (571)270-3516. The examiner can normally be reached on 5:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Cronin can be reached on (571)272-4536. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3747

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAC

/K. C./

Examiner, Art Unit 3747

/Stephen K. Cronin/

Supervisory Patent Examiner, Art Unit 3747